HARVARD LAW SCHOOL
Environmental Law Program
POLICY INITIATIVE

DISTRIBUTED ENERGY RESOURCES AND PUBLIC UTILITY REGULATION

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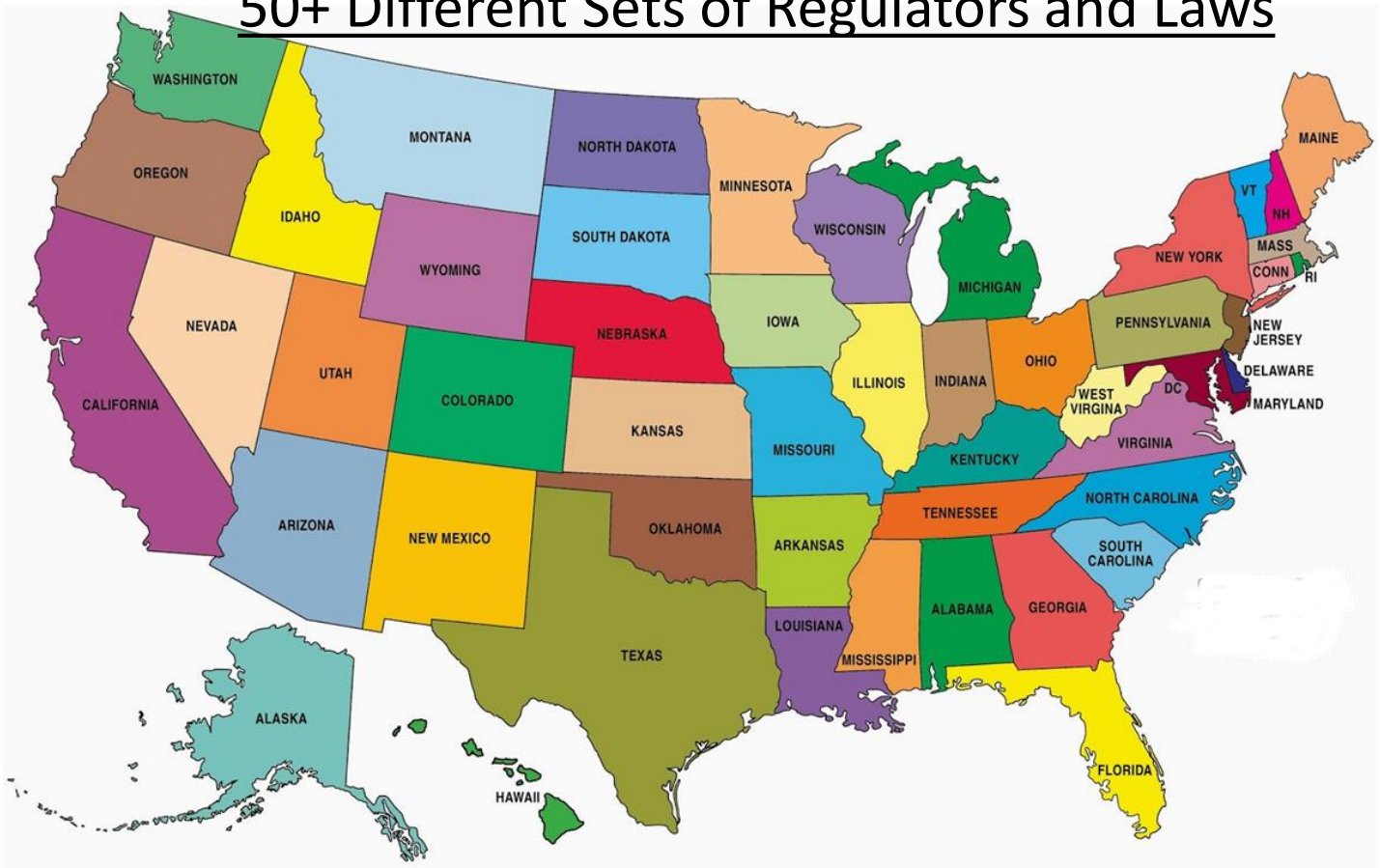
Why DERs?

- *Edison Electric Institute:*

Electric system benefits (e.g. cost savings) attributable to DG can include energy, capacity, transmission and distribution system deferral, and line loss reductions, as well as environmental and other benefits as assessed in each jurisdiction.

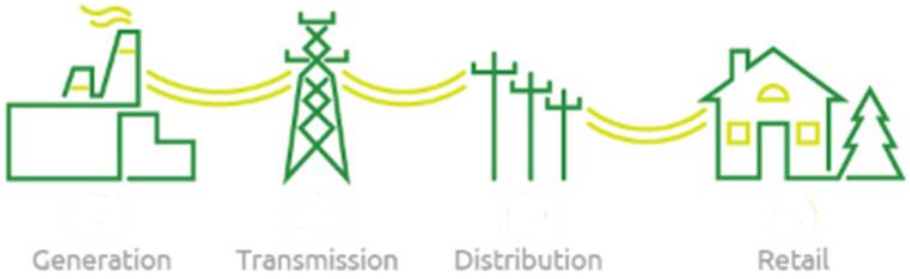
Regulatory Challenges

50+ Different Sets of Regulators and Laws



State Regulation of Electricity

Vertically Integrated Utility



Natural Monopoly?

Wires-Only Utility

FEDERALLY REGULATED

Natural Monopoly?

What Is Utility Regulation?

- Economist Alfred Kahn: "The essence of regulation is the **explicit replacement of competition with governmental orders** as the principal institutional device for assuring good performance."
- What is "good performance"?
  - Price?
  - Service quality?
  - Innovation?

How Does Regulation Work? Utility Ratemaking Process

Two-Step Process

1. Establish the Revenue Requirement
2. Set the Rate Design

- Revenue requirement reimburses utility for its operating expenses and provides **a rate of return on capital investments**.
- Rate design allocates the revenue requirement to various classes of consumers.

Utility Ratemaking

Cost of Service Regulation

- Allows utility to recover operating expenses and earn a regulated rate of return on capital expenditures

$$\text{Rate per KWh} = \frac{[O + r * (V - D)]}{\text{Total KWh estimate}}$$

R: Revenue
O: Operating expenses
V: Value of tangible property
D: Depreciation
r: rate of return

Utility Ratemaking Incentives and DERs

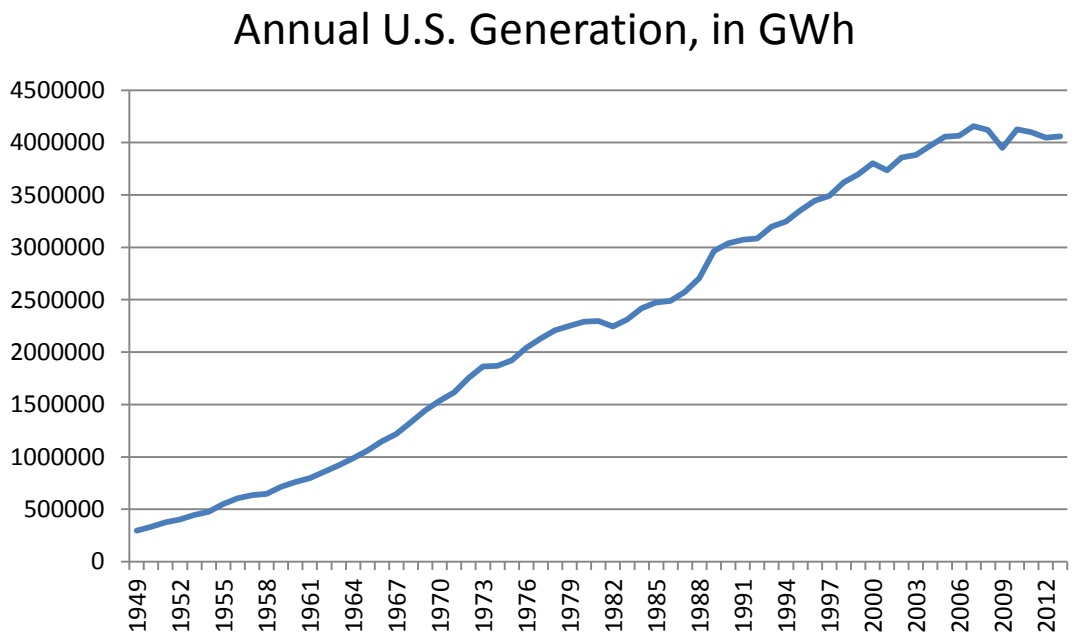
Utility Incentives under Cost of Service Regulation:

1. Don't Screw Up; regulators can deny cost recovery
2. Invest in capital assets
3. Sell more energy
    - Classic throughput incentive
    - Grow demand so you can invest more capital

<u>Incentives oppose DER adoption by ratepayers or 3rd parties</u>

Electricity Industry Culture

Monopoly + Risk of no cost recovery + Steady growth = Conservative Culture + No incentive to innovate



Annual Growth Rates:

- **1950s: 11%**
- **1960s: 9%**
- 1970s: 5%
- 1980s: 3%
- 1990s: 2%
- 2000s: 0.3%

Utility Ratemaking Incentives and DERs

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Rate Design: Compensating Ratepayers with DERs

Alfred Kahn: "The central policy prescription of microeconomics is the equation of price and marginal cost."

- Pricing DERs at "marginal cost" is therefore fair.

BUT

Regulators do not set retail rates at marginal cost because:

- Marginal cost rates would not recover the utility's revenue requirement and
- Public policy reasons.

Rate Design: Compensating Ratepayers with DERs

- *Professor James Bonbright*:

Marginal cost is itself a highly ambiguous term.

- *NARUC Cost Allocation Manual:*

There is considerable difference of opinion as to whether short-run or long-run marginal cost is appropriate for use in cost allocation.

Rate Design: Compensating Ratepayers with DERs

- What are marginal costs?
  - Are they long-term or short-term costs?
  - How do they value externalities? Which ones?

Rate Design: Compensating Ratepayers with DERs

- *Professor Alfred Kahn*:

It is not simple matter to measure marginal costs – that is probably the understatement of the year.

Rate Design: Compensating Ratepayers with DERs

Jean Tirole:

Regulators face a double asymmetry of information:

1. Regulated firms have superior knowledge about the cost of their inputs and the demand for their products and services.
2. They take actions that affect cost and demand.

Regulatory Assistance Project (RAP):

There are as many way of [allocating costs] as there are analysts doing cost-allocation studies.

Rate Design: Compensating Ratepayers with DERs

- How do we calculate marginal costs?
  - Data comes from the utility.
  - No agreement on how to allocate costs to ratepayer groups.

Rate Design: Compensating Ratepayers with DERs

- Debate about DER compensation is between "Cost-of-Service" and "Value-of-Service"
  - Cost-of-service views ratepayers as vehicles for recovering utility costs and see DER compensation as a "cross-subsidy"
  - Value of service recognizes that behind-the-meter resources can provide grid services:
    - Installed capacity
    - Environmental attributes
    - Locational system relief (BQ-DSM example)

New York: Creating Markets for the Distribution Grid

- "Enable and facilitate new energy business models for utilities, energy service companies, and customers to be compensated for activities that contribute to [distribution] grid efficiency."

- Transform utilities so they "integrate diverse resources . . . foster broad market activity that monetizes system and social values . . . and enable active customer and third party engagement that is aligned with the wholesale market and bulk power system."

- Create a platform that is "transparent, flexible, scalable and efficient . . . And will need to be interoperable among a number of diverse technologies, products, and services."

What Role for DERs?

- Jim Rogers, former CEO of Duke Energy:

By 2050, virtually every power plant in the U.S. is going to be retired and replaced. It's almost a blank sheet of paper in terms of how do we design the generation mix going forward

- Chairman of the Electric Power Research Institute (EPRI), 2000:

The makers of pet food spend more money researching dog food than our industry spends researching electricity.

- Slides about federal regulation (FERC)

in case anyone wants to talk about it

The 1970s: PURPA

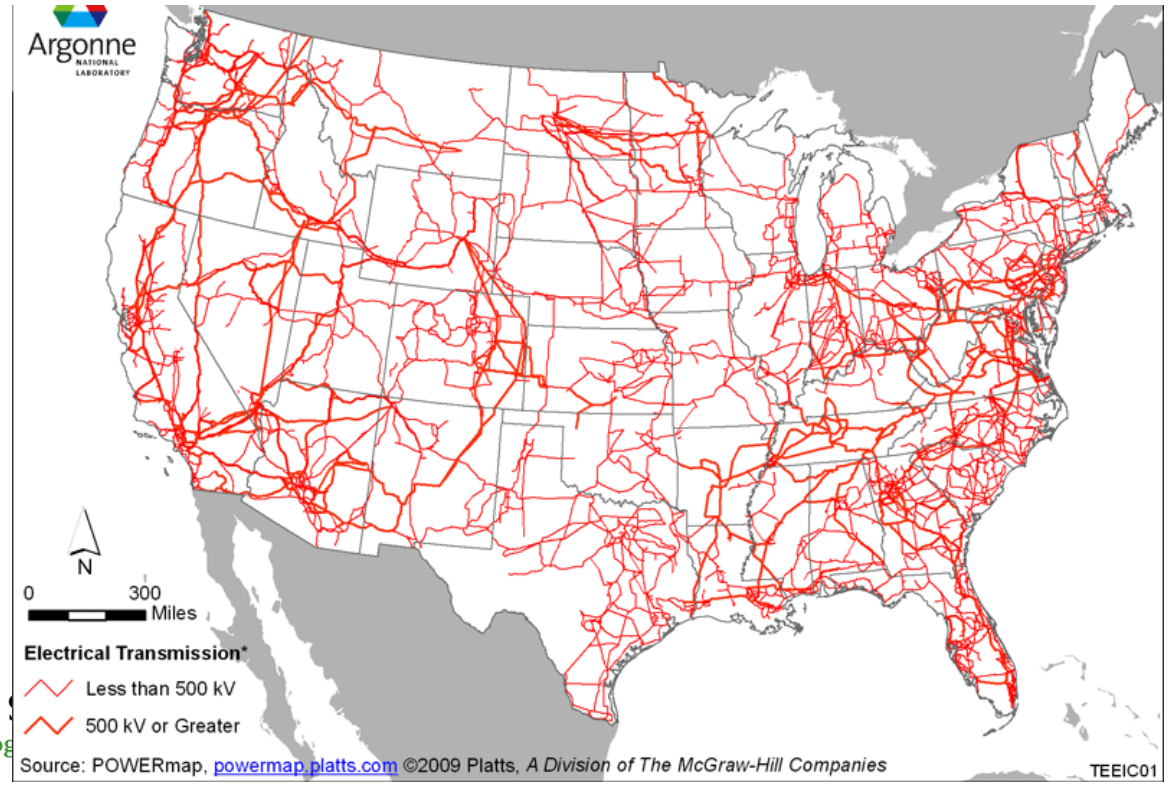
Public Utilities Regulatory Policy Act of 1978

- One of many pieces of energy legislation from the 1970s
- First major law about electricity regulation since 1935
- Introduced competition into electricity generation by requiring vertically integrated monopoly utilities to purchase electricity produced by renewable generators and co-generators
- Implemented by States – impacts vary

The 1990s: Enabling Competition

Key actions at the Federal level:

- Congress changes financial rules for utilities
- FERC mandates open access transmission

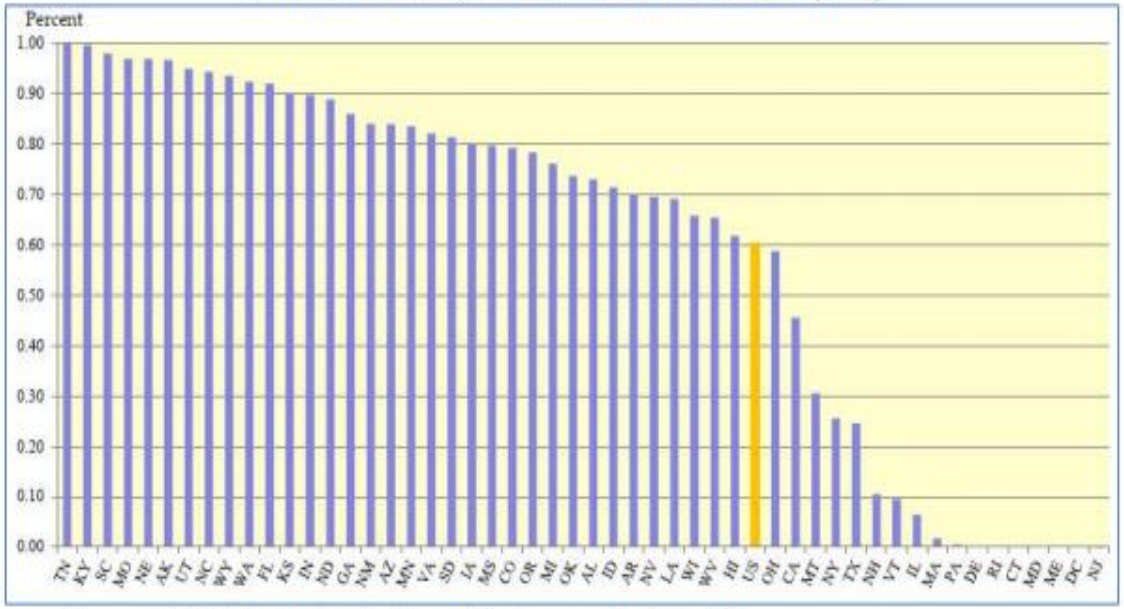


The 1990s: Enabling Competition

Key actions at the State level:

- Some States break up vertically integrated monopolies by requiring or encouraging divestment of generation

States' Reliance on Utility-Owned Generation as a Percent of Total Power Generation in the State (2012)

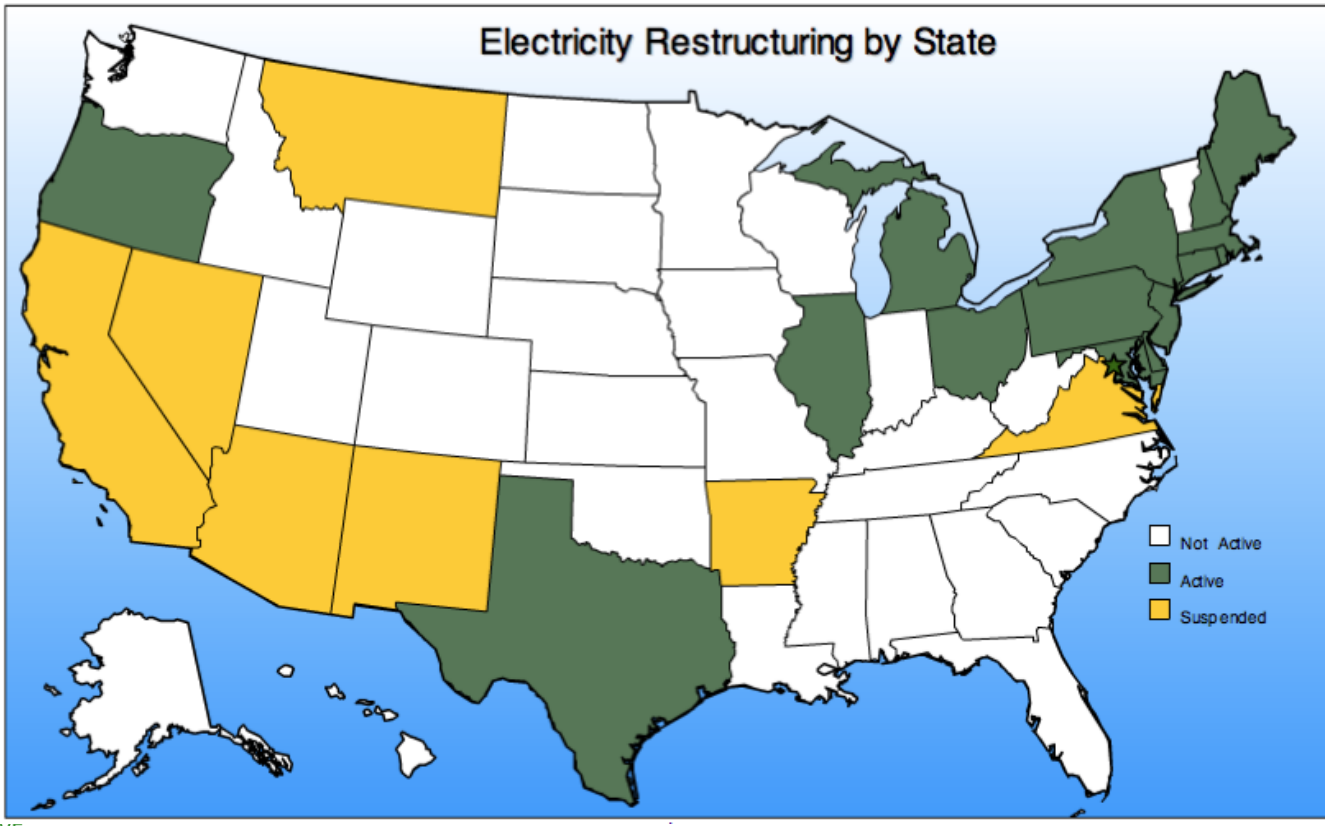


Source: EIA, EIA Generation by Type of Producer and by State, 2012.

The 1990s: Enabling Competition

Key actions at the State level:

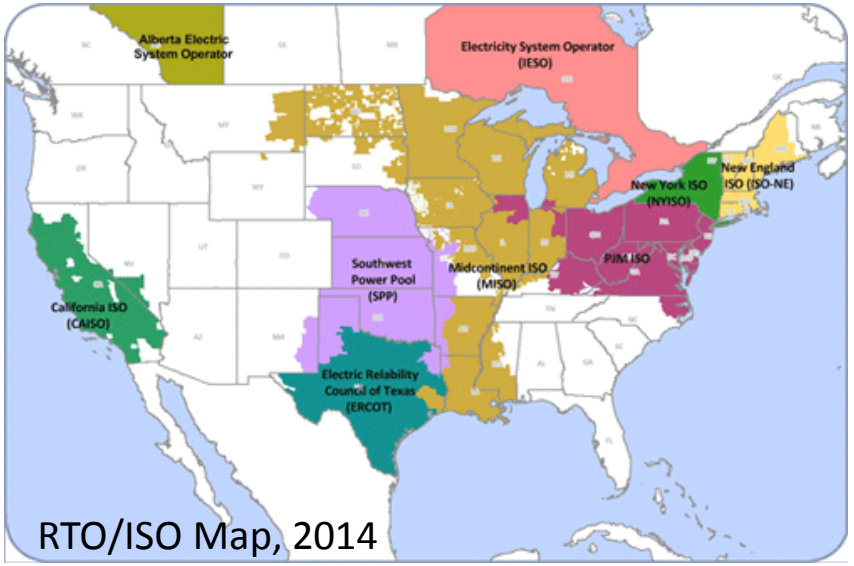
- Some States allow for retail competition



The 1990s: Enabling Competition

Result:

- In much of the country, electricity is bought and sold at wholesale through FERC-regulated regional spot markets
- **Lots of market innovation, but was there any technological innovation?**



RTO/ISO Map, 2014